



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|--------------------------------------|-----------------------------|
| 10/802,811 | 03/18/2004 | Tetsuji Sato | 250645US2 | 5882 |
| 22850 | 7590 | 08/13/2008 | | |
| OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | EXAMINER ALEJANDRO MULERO, LUZ L. | |
| | | | ART UNIT 1792 | PAPER NUMBER |
| | | | NOTIFICATION DATE 08/13/2008 | DELIVERY MODE ELECTRONIC |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com

oblonpat@oblon.com

jgardner@oblon.com

Office Action Summary

Application No.

10/802,811

Applicant(s)

SATO, TETSUJI

Examiner

Luz L. Alejandro

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 May 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-15 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-7 and 9-15 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Claim Objections

Claim 1 is objected to because of the following informalities: at line 16, before "entire", it seems that – the – should be inserted for proper grammar. Appropriate correction is required.

Claim 9 is objected to because of the following informalities: at line 16, before "entire", it seems that – the – should be inserted for proper grammar. Appropriate correction is required.

Claim 15 is objected to because of the following informalities: at line 3, "-volum" should read -- volume -- for proper spelling. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-7 and 9-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification, as originally filed, fails to describe wherein the entire structure/electrode of the supporting member is installed in a "vacuum atmosphere" inside the vacuum chamber, as required by independent claims

1 and 9. Note that page 14, lines 2-7, mentioned by applicants in their remarks, only required that the inner space of the vacuum chamber 11 can be exhausted via the exhaust ring 21, thereby setting the **inner space** thereof under a predetermined vacuum level. The examiner respectfully disagrees with applicant's interpretation of the mentioned part of the specification providing support for the newly added limitation since such part of the specification does not support the limitation of the **entire** structure/electrode of the supporting member being installed in a vacuum atmosphere inside the vacuum chamber. Moreover, none of the drawings support the newly added limitation since it is clear that parts of the claimed structure/electrode supporting member are not installed within the vacuum atmosphere inside the vacuum chamber.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-7 and 9-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1 and 9, the phrase "vacuum atmosphere" in the limitation of the entire structure/electrode supporting member being installed in a vacuum atmosphere inside the vacuum chamber, is not clear since the term "vacuum atmosphere" is a broad term that could be interpreted in different ways. Clarification and/or correction are requested.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by Taniguchi et al., US 5,266,119.

Taniguchi et al. shows the invention as claimed including a vacuum processing apparatus comprising: a vacuum chamber 56d accommodating therein a substrate 1 to be processed, allowing an inner space of the vacuum chamber to be maintained at a vacuum level; a first structure 55 fixedly disposed at a location in the vacuum chamber; a second structure 50 installed in the vacuum chamber and facing the first structure, the second structure being vertically movable so as to vary a distance between the first structure and the second structure; a driving mechanism for vertically moving the second structure, the driving mechanism being installed outside the vacuum chamber; a bellows unit 8d/8e/8f for airtightly sealing an opening, the bellows unit having an upper bellows portion 8d/8e, a lower bellows portion 8f, and a ring member 8c connected to the driving mechanism, wherein the opening, through which the second structure is driven by the driving mechanism via the ring member, is provided at the vacuum chamber, and the ring member is disposed between the upper bellows portion and the lower bellows portion; and a structure supporting member 51/7 for supporting the

second structure connecting the ring member to the second structure, the entire structure supporting member being installed in a vacuum atmosphere inside the vacuum chamber, wherein the upper bellows portion and the lower bellows portion are oppositely extended and contracted in accordance with a vertical movement of the ring member while maintaining a constant total length of the bellows unit (see, the entire document, especially fig. 2 and col. 5-line 64 to col. 9-line 44).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7 and 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomoyoshi et al., US 2004/0035364 in view of Taniguchi et al., US 5,266,119.

Tomoyoshi et al. shows the invention substantially as claimed including a plasma processing apparatus comprising: a vacuum chamber 1/11 accommodating therein a substrate to be processed, allowing an inner space of the vacuum chamber to be maintained at a vacuum level; a first electrode 3/13 capable of being fixedly disposed at a location in the vacuum chamber; a second electrode 2/12 installed in the vacuum chamber and facing the first electrode, the second electrode being vertically movable so as to vary a distance between the first electrode and the second electrode; a driving

mechanism for vertically moving the second electrode, the driving mechanism being installed outside the vacuum chamber; a bellows unit 7/17 for airtightly sealing an opening; and a high frequency power source 14/15 generating plasma between the first electrode and the second electrode (see, for example, figs. 1 and 6 and their descriptions).

Tomoyoshi et al. does not expressly disclose the claimed upper bellows/lower bellows/ring/supporting member structure. Taniguchi et al. discloses an apparatus including a bellows unit having an upper bellows portion 8d/8e, a lower bellows portion 8f, and a ring member 8c connected to a driving mechanism, wherein the opening, through which the second structure is driven by the driving mechanism via the ring member, is provided at the vacuum chamber, and the ring member is disposed between the upper bellows portion and the lower bellows portion, and a structure supporting member 51/7 for connecting the ring member to the second structure, the entire structure supporting member being installed in a vacuum atmosphere inside the vacuum chamber, wherein the upper bellows portion and the lower bellows portion are oppositely extended and contracted in accordance with a vertical movement of the ring member while maintaining a constant total length of the bellows unit (see the entire document, especially the Summary of the Invention and fig. 2 and its description). Therefore, in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tomoyoshi et al. so as to comprise the claimed upper bellows/lower bellows/ring/ supporting member structure in order to provide a small-sized and inexpensive sealing mechanism for the

processing apparatus that can reduce or remove the thrust/force applied to the substrate/electrode support moving structure.

With respect to claims 2 and 10, it would have been an obvious choice of design to one having an ordinary skill in the art at the time the invention was made to modify the apparatus of Tomoyoshi et al. modified by Taniguchi et al. as to have the lower electrode as the first fixed electrode and the upper electrode as the second movable electrode if movement of the upper electrode instead of the lower electrode is desired, and such limitation would not lend patentability to the instant application absent the showing of unexpected results.

Concerning claims 3-7 and 11-15, note that the upper electrode 3/13 of the apparatus of Tomoyoshi et al. is supported from underneath the lower electrode (by structures 1/11 and 9/19); the electrode supporting member includes an exhaust ring 8/18 for uniformly exhausting the vacuum chamber and a cylindrical member 9/19-20 for protecting an inner wall of the vacuum chamber.

Concerning claims 6-7 and 14-15, note that the apparatus of Tomoyoshi et al. in view of Taniguichi et al. further comprises a substrate supporting member for supporting the substrate to be processed above the lower electrode, wherein the substrate supporting member is vertically movable by the driving mechanism to pass through the lower electrode. With respect to claims 7 and 15, note that the distance between the first electrode and the second electrode in the apparatus of Tomoyoshi et al. modified by Taniguchi et al. is varied while constantly maintaining a volume of the vacuum chamber maintained in vacuum.

Claims 1-2 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koshimizu, US 5,980,687 in view of Taniguchi et al., US 5,266,119.

Koshimizu shows the invention substantially as claimed including a plasma processing apparatus comprising: a vacuum chamber 102 accommodating therein a substrate W to be processed, allowing an inner space of the vacuum chamber to be maintained at a vacuum level; a first lower electrode 110 capable of being fixedly disposed at a location in the vacuum chamber; a second upper electrode 116 installed in the vacuum chamber and facing the first electrode, the second electrode being vertically movable so as to vary a distance between the first electrode and the second electrode; a driving mechanism 120 for vertically moving the second electrode, the driving mechanism being installed outside the vacuum chamber; a bellows unit 122 for airtightly sealing an opening; and a high frequency power source 130/134 generating plasma between the first electrode and the second electrode (see figs. 1 and 3 and their descriptions).

Koshimizu does not expressly disclose the claimed upper bellows/lower bellows/ring/supporting member structure. Taniguchi et al. discloses an apparatus including a bellows unit having an upper bellows portion 8d/8e, a lower bellows portion 8f, and a ring member 8c connected to a driving mechanism, wherein the opening, through which the second structure is driven by the driving mechanism via the ring member, is provided at the vacuum chamber, and the ring member is disposed between the upper bellows portion and the lower bellows portion, and a structure supporting

member 51/7 for supporting the second structure and connecting the ring member to the second structure, the entire structure supporting member being installed in a vacuum atmosphere inside the vacuum chamber, wherein the upper bellows portion and the lower bellows portion are oppositely extended and contracted in accordance with a vertical movement of the ring member while maintaining a constant total length of the bellows unit (see the entire document, especially the Summary of the Invention and fig. 2 and its description). Therefore, in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Koshimizu so as to comprise the claimed upper bellows/lower bellows/ring/ supporting member structure in order to provide a small-sized and inexpensive sealing mechanism for the processing apparatus that can reduce or remove the thrust applied to the carrier shaft.

Claims 3-7 and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koshimizu, US 5,980,687 in view of Taniguchi et al., US 5,266,119 as applied to claims 1-2 and 9-10 above, and further in view of Kaminishizono et al., US 5,647,912 or Nishimoto et al., US 7,147,749 or Tomoyoshi et al., US 2004/0035364.

Koshimizu and Taniguchi et al. are applied as above but do not expressly disclose wherein the upper electrode is supported from underneath the lower electrode; and wherein the electrode supporting member includes an exhaust ring for uniformly exhausting the vacuum chamber and a cylindrical member for protecting an inner wall of the vacuum chamber. Kaminishizono et al. discloses an apparatus comprising a lower

electrode and an upper electrode, wherein the upper electrode is supported from underneath the lower electrode, the electrode supporting member includes an exhaust ring 7 for uniformly exhausting the vacuum chamber and a cylindrical member 11 for protecting an inner wall of the vacuum chamber (see, for example, figs. 4-6 and their descriptions). Additionally, Nishimoto et al. discloses an apparatus comprising a lower electrode 30 and an upper electrode 22, wherein the upper electrode is supported from underneath the lower electrode, the electrode supporting member includes an exhaust ring 64 for uniformly exhausting the vacuum chamber and a cylindrical member 26 for protecting an inner wall of the vacuum chamber (see, for example, fig. 1 and its description). Additionally, Tomoyoshi et al. discloses an apparatus comprising a lower electrode 2/12 and an upper electrode 3/13, wherein the upper electrode is supported from underneath the lower electrode (by structures 1/11 and 9/19), the electrode supporting member includes an exhaust ring 8/18 for uniformly exhausting the vacuum chamber and a cylindrical member 9/19-20 for protecting an inner wall of the vacuum chamber (see, for example, figs. 1 and 6, and their descriptions). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Koshimizu modified by Taniguchi et al. so as to have the claimed electrode support member in order to, for example, reduce contamination of the chamber walls, provide suitable support for the electrode, and uniformly exhaust gasses from the chamber.

Concerning claims 6-7 and 14-15, note that the apparatus of Koshimizu in view of Taniguchi et al. and Kaminishizono et al. or Nishimoto et al. or Tomoyoshi et al.,

further comprises a substrate supporting member for supporting the substrate to be processed above the lower electrode, wherein the substrate supporting member is vertically movable by the driving mechanism to pass through the lower electrode. With respect to claims 7 and 15, note that the distance between the first electrode and the second electrode in the apparatus of Koshimizu modified by Taniguchi et al. and further modified by Kaminishizono et al. or Nishimoto et al. is varied while constantly maintaining a volume of the vacuum chamber maintained in vacuum.

Response to Arguments

Applicant's arguments filed 5/30/08 have been fully considered but they are not persuasive. Applicant argues that Taniguchi et al. does not disclose the entire structure supporting member installed in the vacuum chamber. First, the examiner respectfully points out, as stated in the above 112, first paragraph rejection, that the specification, as originally filed, fails to describe wherein the entire structure/electrode of the supporting member is installed in a "vacuum atmosphere" inside the vacuum chamber, as required by independent claims 1 and 9. Note that page 14, lines 2-7, mentioned by applicants in their remarks, only required that the inner space of the vacuum chamber 11 can be exhausted via the exhaust ring 21, thereby setting the **inner space** thereof under a predetermined vacuum level. The examiner respectfully disagrees with applicant's interpretation of the mentioned part of the specification providing support for the newly added limitation since such part of the specification does not support the limitation of the **entire** structure/electrode of the supporting member being installed in a vacuum

atmosphere inside the vacuum chamber. Moreover, none of the drawings support the newly added limitation since it is clear that parts of the claimed structure/electrode supporting member are not installed within the vacuum atmosphere inside the vacuum chamber. Furthermore, note that the phrase "vacuum atmosphere" in the limitation of the entire structure/electrode supporting member being installed in a vacuum atmosphere inside the vacuum chamber, is a broad term that could be interpreted in different ways.

Applicant argues that pressure at the space between the supporting member 7 and bellows 8f in Taniguchi et al. may be that of an atmospheric pressure. However, there is nothing in the Taniguchi et al. reference that supports such an argument. Furthermore, the examiner respectfully disagrees with such an argument and directs applicant to, for example, col. 6, lines 41-44, col. 7, lines 4-11, wherein the Taniguchi et al. reference seems to disclose a controlled vacuum atmosphere in such a space. Therefore, the examiner respectfully submits that the structure supporting member 51/7 in Taniguchi et al. is contained within a vacuum atmosphere in the vacuum chamber. Moreover, note that item 8c is also installed within the chamber (see fig. 2).

With respect to the Tomoyoshi et al. reference, applicant argues the bottom surface 1A and the chamber 1 supports the upper electrode 3 and connects the drive mechanism 6B to the upper electrode 2 in order to move it up and down, and thus these items correspond to the electrode supporting member of the present invention. However, the examiner respectfully disagrees with such a statement since it is clear from the reference and from the previous and the above rejections, that the second

electrode 2/12 is the electrode being vertically moved. Furthermore, the examiner respectfully submits that both the structure and electrode supporting members are contained within the walls of the processing chamber.

Concerning the Koshimizu reference, applicant argues that “the first 110 and second susceptors 116, each of which supports and vertically moves a wafer W... may correspond to the electrode supporting member of the present invention, but are placed between the vacuum and the atmospheric atmosphere, that is, the inside and the outside of the vacuum chamber, rather in the inside, considering that the bellows 114 and 122 separated the vacuum area from the atmospheric area”. The examiner respectfully disagrees with such an argument since there is no disclosure in the Koshimizu reference that supports such a statement. Furthermore, if such interpretation was given to the Koshimizu apparatus, then the same could be interpreted from the drawings of the instant claimed invention since bellows 18a-18c would separate the vacuum area from the atmospheric area in the instant claimed invention vacuum chamber, and therefore, the electrode supporting member of the instant invention would be placed between the vacuum and the atmospheric atmosphere.

Concerning the Kaminishizono et al. and the Nishimoto et al. references, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Luz L. Alejandro/
Primary Examiner, Art Unit 1792

August 7, 2008